

# KUDREMUKH NATIONAL PARK, KARNATAKA: A PROFILE AND A STRATEGY FOR THE FUTURE

(With two plates)

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**Key words:** Kudremukh, langur, liontailed macaque, mining, Karnataka, Western Ghats

The 600 sq. km Kudremukh National Park straddles the Western Ghats adjoining the districts of Chikmagalore, Udupi and Dakshina Kannada. Rich deposits of magnetite and haematite in the Park has led to extraction of iron ore by the Kudremukh Iron Ore Company Limited (KIOCL) since 1980. The vegetation is of Western Tropical Evergreen Forest, with higher slopes and rolling hills having typical shola-grassland mosaic. Over 35 species of amphibians, 400+ species of birds and 38 species of mammals occur here. Flagship mammals include the liontailed macaque and a small isolated hitherto undescribed population of langurs, small in size, dark brown and shy, sharing the habitat of the liontailed macaque, the Malabar civet, and the brown palm civet. The flagship birds are the great pied hornbill, Nilgiri wood-pigeon, Wynaad laughingthrush, grey-breasted laughingthrush, blue-winged parakeet, grey-headed bulbul, white-bellied treepie and white-bellied blue-flycatcher. The KIOCL mining operations have caused some disturbance in the eastern part of the Park. KIOCL mining will close down soon and the infrastructure left behind needs to be put to good use without violating National Park rules. This paper suggests the appropriate course of action to address this issue.

## INTRODUCTION

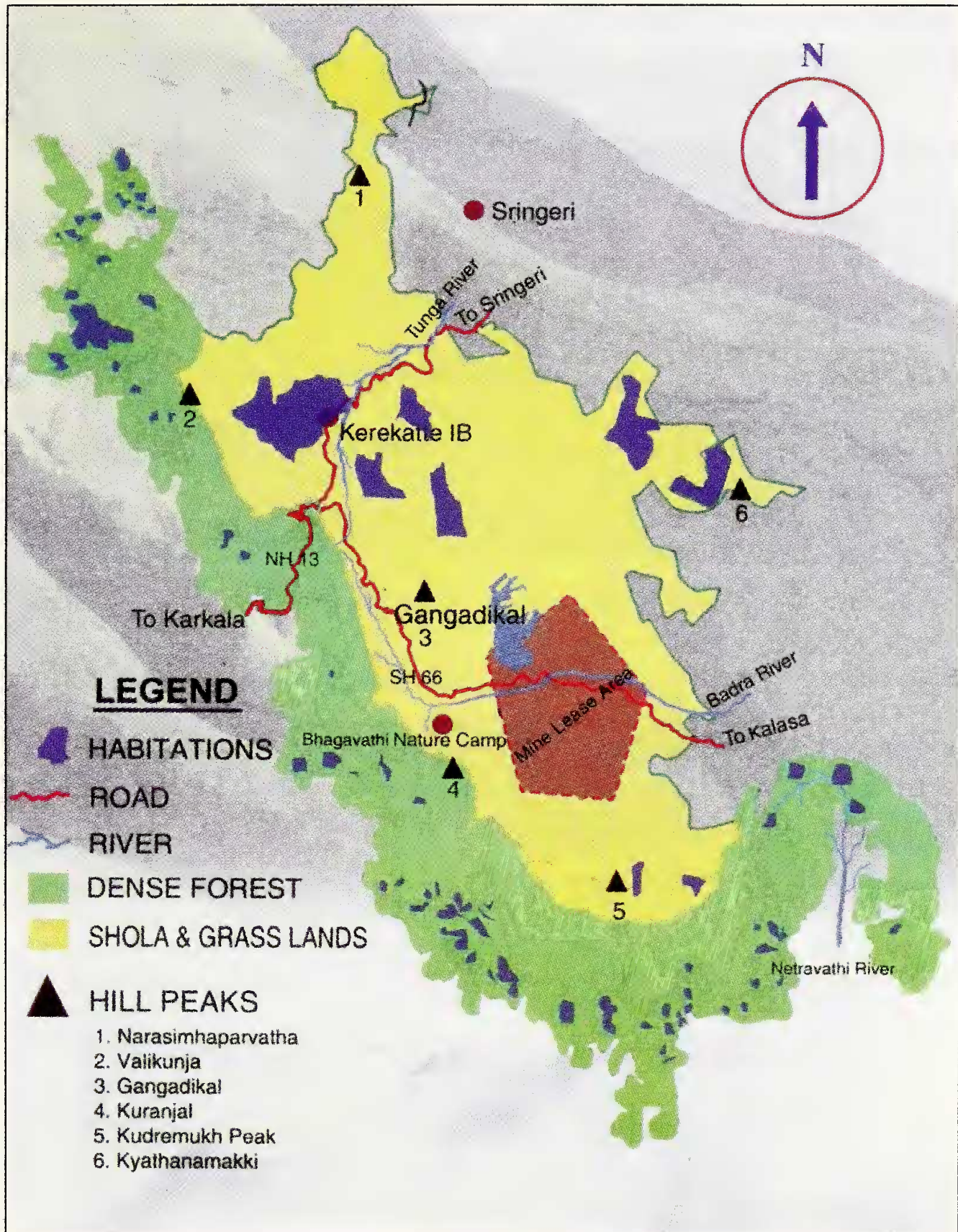
The Western Ghats forests comprising of Tungabhadra State Forest, the South Bhadra State Forest of the revenue district of Chikmagalur as well as the Naravi Reserve Forest and the Andar Reserve Forest of the revenue districts of Dakshina Kannada (DK) and Udupi (12°-16° N latitude) are now collectively designated as the Kudremukh National Park (KNP), notified on September 4, 1987 under Section 35(1) of the Wildlife Protection Act. It is under the control of Kudremukh Wildlife Division of the Karnataka State Forest Department. The Division looks after KNP, Someshwara and Mukambika Wildlife Sanctuaries in Udupi and DK districts. The Division Headquarters is located at Karkala Town. It has a Deputy Conservator of Forest (DCF) as the head, with three Assistant Conservators of

Forest (ACF) located at the Headquarters, the Kudremukh mining township, and the Mukambika Wildlife Sanctuary, Kundapur Taluk, respectively. The KNP having a total area of about 600 sq. km comprises lowland as well as highland Tropical Evergreen Forests, shola-grassland-savanna and a mosaic of Mixed Semi-evergreen Forests and plantations in the peripheral areas (Plate 1, Fig. 1). The altitude ranges from 300 m in the lowlands to 1,892 m at the highest peak of Kudremukh. The average altitude of the highland hills is about 1,000 m. The area receives good rainfall during monsoon months (June-October; range = 1,778-6,350 mm, highest recorded was 10,000 mm, in 1984).

Precipitation and runoff regime is roughly defined at the crest of the ghat which also forms the western and eastern facies of the landscape. Thus, the watershed west and south of the divide is very steep, contributing to rapid runoff of short-span river systems that drain into the Arabian sea. The watershed east and north of the divide caters to river systems that meander through gentler slopes and gullies and flow eastward

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Fig. 1: Map of Kudremukh National Park



Fig. 2: Liontailed macaque *Macaca silenus*, one of the flagship species of Kudremukh National Park



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Fig. 3: A view of the mining township, from the mining area, within Kudremukh National Park

towards the Bay of Bengal. Two major rivers, the Tunga and the Bhadra originate from the dense Bhagavati Forest. While Tunga flows due north-northeast towards Sringeri, Bhadra flows due east passing through the leasehold of the public sector enterprise, Kudremukh Iron Ore Company Ltd (KIOCL) mining area, both join up near Bhadravati town to form Tungabhadra river, and eventually merge with River Krishna.

The KNP is very rich in biodiversity. The vegetation is typical of the tropical evergreen forests. Though there are inventories and listings of prominent hardwoods, shrubs and herbs, no comprehensive data is available on the total plant species of the entire area.

Over 35 species of amphibians occur here and their density and diversity have been recorded. Over 400 species of birds have been recorded for the KNP area. The KNP hosts 38 species of mammals belonging to 28 genera. Four species are endemic to the Western Ghats; three of them being the liontailed macaque *Macaca silenus* (rare and endangered; Plate 2, Fig. 2), the Malabar civet *Viverra civettina* and the brown palm civet *Paradoxurus jerdoni* (Hussain *et al.* 1999). The fourth is a small isolated population of langur species that has recently been noticed sharing the shola habitat with the liontailed macaque. This langur differs a great deal from the common langur *Semnopithecus entellus* but is closer to the Nilgiri langur *Trachypithecus johni*. It is possible that this may be a distinct species of langur, and more study is needed to ascertain it. These four are the flagship species of the region.

#### VEGETATION STRUCTURE

Kadambi (1942a, b) has distinguished 3 types of vegetation structure in the *Poeciloneuron* forests of South Bhadra and Tunga, namely Mixed Evergreen, Semi-pure Evergreen and Pure Evergreen Forests, corresponding to increasing concentrations of *Poeciloneuron*. Rai (1981) has studied the

structure and primary productivity in South Bhadra RF (Reserve Forest) corresponding to the gregarious *Poeciloneuron* stands.

The extensive lowland forests comprising Naravi RF and Andar RF and the adjacent Someshwara Wildlife Sanctuary are included under the KNP. These forests comprise mainly of Tropical Evergreen and Moist Deciduous types. Some areas have been extensively planted with teak *Tectona grandis*.

#### FAUNA OF KUDREMUKH NATIONAL PARK

##### Ornithology

From the distributional ranges given in available literature, it appears that the total number of bird species occurring in the region could be  $400 \pm 20$ . These were based on actual sightings in the highland/lowland forests as well as the secondary forests and urban areas of the coastal belt. The tropical forests of the southern Western Ghats (including the coastal areas) harbour a lower diversity of bird species in comparison to similar habitats in African and Neotropical forests. Daniels (1984) estimated that in the evergreen forests of southwestern India, a maximum of 150 species of birds are present in an area less than 15 sq. km, whereas 478 species have been recorded in Ecuador (S. America) and 365 species in Gabon (Africa). The recent rapid changes in the landscape may have caused the disappearance of some species, while some others may have recently replaced these in the changed habitats.

The flagship species of tropical forest birds which are either endemic to the southern Western Ghats or have a patchy distribution of small populations, are represented in the KNP region by great pied hornbill *Buceros bicornis*, Nilgiri wood-pigeon *Columba elphinstonii*, Wynaad laughingthrush *Garrulax delesserti*, grey-breasted laughingthrush *G. jerdoni*, blue-winged parakeet *Psittacula columboides*, grey-headed bulbul *Pycnonotus priocephalus*, white-bellied treepie *Dendrocitta leucogastra*, white-bellied

blue-flycatcher *Cyornis pallipes* and Nilgiri flycatcher *Eumyias albicaudata*. Some other species such as black eagle *Ictinaetus malayensis* and Ceylon frogmouth *Batrachostomus moniliger* also occur.

Though the KIOCL mining sector was devoid of any species, surprisingly small patches of remnant shola forests within the actual mining area harboured small populations of habitat specialists. Kudremukh township with a mosaic of urban ornamental plantations intermingling with patches of dense secondary scrub hosted yet another diverse bird population. Lowland forests of KNP also hosted a good species assemblage typical of the area. Two censuses were carried out, at each site in the KNP by the author, results of which are given in Table 1.

### Mammals

In the KNP area, endemics are represented by primates (2 spp.) and small carnivores (2 spp.) (Table 2). Except the Nilgiri tahr *Hemitragus hylocrius*, all other endemics of the Western Ghats are found here. The KNP hosts perhaps the single

**Table 2:** Number of genera and species and endemic mammals in KNP

Mammal groups	Genera	Species	Endemics
Primates	3	5	2
Large carnivores	1	2	-
Small carnivores (Felids)	1	4	-
Small carnivores (others)	4	7	2
Canids	3	3	-
Mustelids	2	3	-
Rodents	5	5	-
Deer	4	4	-
Other species	5	5	-
<b>Total</b>	<b>28</b>	<b>38</b>	<b>4</b>

largest population of the flagship species, the liontailed macaque, north of Silent Valley in Kerala. It is estimated that over 200-300 of them occur in the KNP belt with a few other small populations scattered in the lowland forests of Someshwara and Mookambika Wildlife Sanctuaries located north of KNP.

As mentioned earlier, the distinct langur population of the shola forests needs further field

**Table 1:** A quick analysis of the results of the censuses at Kudremukh National Park (including mining area)

Sampling site	Altitude range above msl (in m)	Distance from core mining area	Habitat/Vegetation	No. of species recorded	Habitat specialist species
Mining site	800-1,000	—	Highly disturbed open grassy hills and small shola patches.	12	3
Kudremukh township	700-800	500 m	Urban area with plantation and gardens.	32	0
Samse village	800-1,000	5 km	Mosaic of plantation, shola and scrub.	26	2
Gangrikal	800-1,500	8 km	Shola and grasslands.	22	5
Lakya Dam, backwaters	900-1,000	3 km	Water reservoir surrounded by grasslands and monoculture plantations.	6	0
Naravi Forest	300-600	15 km	Dense lowland forests.	36	4
Horanadu	800-900	15 km	Deciduous scrub. Rain-shadow area.	6	0

and DNA research to ascertain its specific status. The other species reported recently is the rare and endangered Malabar civet (*Viverra civettina*), small populations of which have been frequently reported from Mookambika and Someshwara Wildlife Sanctuaries as well as lowland and highland forests of KNP.

The Indian gaur *Bos gaurus* is the largest common ungulate occurring in both lowland and highland forests of KNP, followed by sambar *Cervus unicolor* and chital *Axis axis*. These are the most common animals in the area. However, large-scale forest clearing for agriculture and human settlements in the past 100 years, particularly in the lowland forests, has fragmented their populations into smaller herds, frequently bringing them into conflict with human settlements. The populations of their natural predator, the tiger *Panthera tigris* has also reduced due to anthropogenic pressures. However, in 2001, a tigress took residence very close to the mining area and raised two cubs. As everywhere else in the region, the leopard *Panthera pardus* is still holding its own, particularly in the secondary mixed forests and mosaic vegetation.

It is estimated that over 150 liontailed macaques are present in the KNP, most of which are confined to heavy rainfall areas of shola/grasslands of Bhagavati Forest, Tungabhadra State Forest (Kerekatte) and steep western slopes of the ghats and lowland forests of Andar and Naravi Reserve Forests (more than 200 m above msl). A total of ten troops were encountered by the author. These are listed in Table 3.

The occurrence of the unidentified langurs needs further observation. This population which may have been overlooked so far by earlier workers needs to be studied to determine whether they are a distinct and new species. The animals are small, with very dark and thick coat and pale brown head, slow moving in the canopy and confined to dense highland forests of KNP.

**Table 3:** Troops of liontailed macaques encountered at KNP

Site	Habitat	No. of troops	No. of individuals per troop
Gangrikal shola complex	Shola/ grassland	4	14, 8, 10 & 9
Kadambi/ Bhagavati	Evergreen	2	8 & 7
Kerekatte	Evergreen	3	12, 11 & 9
Agumbe	Evergreen	1	10
Total		10	98

Elephants *Elephas maximus* are very rare in KNP, though there have been occasional individuals straying in the periphery of the Park. In 2001, three individuals came up the pipeline road and stayed within the Park. This population is more or less resident now. Several species of bats occur in both lowland and highland forests.

#### RESOURCE EVALUATION

The Western Ghats of Karnataka possess some of the most pristine lowland and highland forests in the entire Western Ghats chain. Though these forests have gradually been fragmented into smaller disjointed stretches of Evergreen, Moist Evergreen, Moist Deciduous, mixed scrub, and regenerating woodlands, the diversity of mammalian fauna still holds out on its own in smaller pockets. The transitional belt of lowland forests of the coastal zone and highland forests of steep hill slopes, culminating in the specialised vegetation of hill crests which then gradually stretch eastwards into a rolling mosaic of forests mingled with plantations, host a number of species including some rare endemics. The rich wildlife of the area is underscored by the fact that two national parks and several wildlife sanctuaries straddle the Western Ghats.

The Kudremukh National Park serves both eastern and western regions of the Western Ghats. The major portion of Malnad area and the entire

district of Udupi and Dakshina Kannada depend on the water regime emanating from the Kudremukh area. The districts in the immediate vicinity served are Shimoga, Chikmagalur and Hassan in the east and Udupi and Dakshina Kannada in the west. Several perennial and seasonal streams/ rivulets/ rivers exist in the KNP area. Among the east flowing rivers, Tunga and Bhadra and their tributaries Varada and Hagari have their origin within KNP with a catchment area of 684.4 sq. km and total length of 528 km. The two rivers join up after Bhadravati town to become the Tungabhadra river.

The west flowing, perennial Sita, Suvarna, Udyavar, Mulki, Gurpur and Nethravathi rivers serve the Udupi and Dakshina Kannada districts and their total catchment area is over 8,326 sq. km and total spread area is 833,595 ha. The average annual rainfall here is 4,420 mm. The extent to which the villages around KNP depend on these freshwater sources — in terms of irrigation, fishing, daily consumption, number of people served — is given in Table 4. The following are the crops that depend on the freshwater sources:

A. North, east and southwards: Tea, coffee, cardamom, pepper, arecanut and paddy in the immediate surroundings. Paddy, sugarcane, banana, cereal crops, etc. in the down river basin and command areas of Tunga and Bhadra dams and other regions right up to the Bay of Bengal.

B. Westwards: Coconut, rubber, arecanut, paddy, sugarcane, and other crops.

#### HUMAN IMPACT EVALUATION

The area has no legally permanent human settlements, except for a few communities that have existed here for a long time. Even in the periphery of the Park, particularly along its eastern and northern boundaries, the human population is sparse and widespread among plantations and small holdings of cultivated fields. Unlike other national parks and sanctuaries, anthropogenic pressures on the vegetation for fuel and other

**Table 4:** The figures showing the dependence of Dakshina Kannada and Udupi on the rivers flowing out from KNP

Total agricultural land	286,000 ha
Groundwater -	
Domestic consumption	43.7 million cu. m/year
Irrigation	427 million cu. m/year
Total estimated consumption	471 million cu. m/year
Annual replenishment	1,245 million cu. m/year
River outflow – annual average	29,561 million cu. m/year
Coastal fisheries – annual average catch	143,000 tonnes
Population of the districts (Udupi & D.K.)	2.69 million (in 1961)
Density	319 per sq. km

Compiled from various sources

needs are minimal in KNP. However, as is happening in other developing countries of the tropics, there are many problems faced by the KNP ecosystem. There have been recent cases of large-scale encroachment of Park forests in the periphery by rich landholders for illegal extension of coffee and other plantations. The KIOCL township is the only and the most populated human habitation in the KNP (Plate 2, Fig. 3). The total human population of the township was estimated to be 10,636 (1991 Census). Though actual figures are not available, it is estimated that 350-450 privately owned cattle (mostly cows and a few buffaloes) exist in the Park area. A list of the enclosures in the Park is given in Table 5. Encroachment of forest land by marginal farmers, large plantations, as well as cattle graziers is becoming a serious problem.

The major activity in the Park ecosystem is of iron ore mining by the public sector Kudremukh Iron Ore Company Ltd (KIOCL). The company has been operating here since 1980 in the leased area. Most of the actual mining is in grass topped bare hills (370 ha) with scattered small sholas.

**Table 5:** Details of occupied land within Kudremukh National Park**a:**

Range	No. of enclosures	No. of families	Total land holding (in ha)
1. Karkala Wildlife Range, Karkala	34	140	238.28
2. Venoor Wildlife Range, Belthangad	32	256	797.92
3. Sringeri Wildlife Range, Kerekatte	17	1,009	1,273.02
4. Kudremukh Wildlife Range, Kudremukh	08	54	80.26
	91	1,459	2,389.48

**b:**

1. Total extent of land leased to KIOCL	4,605.02 ha
2. Extent of forest land leased	3,203.55 ha
3. Extent of forest land converted inside leased area	1,452.74 ha
4. Extent of forest land converted for pipeline outside the leased area	30.00 ha
5. Extent of forest land likely to submerge outside the leased area due to raising of dam height	340.00 ha
6. Total forest land being utilised by KIOCL	1,822.74 ha

#### Areas that have some level of threat to wildlife and its habitat

Of the entire 600 sq. km area of the Kudremukh National Park (KNP), some level of threat to wildlife and its habitat is present at its extreme eastern border where the KIOCL has its operations. The mining concession and its surroundings are a hilly terrain, mostly covered with grasslands and small stunted shola patches. These grasslands were originally the traditional grazing (*gomal*) lands for the cattle of the villages nearby. In fact, right in the Park premises there are a couple of private holdings rearing about 200-300 cattle which freely graze around.

On the whole, the mining concession with its establishment, mines, processing area and

township is located very close to the eastern and traditionally exploited border of the Park. Tea, coffee, cardamom, pepper and areca plantations as well as paddy cultivation are the major agricultural activities in this area. Due to mosaic vegetation (some good forest patches and tree cover interspersed with villages and cultivation), there is a good bird and insect diversity, with some wild animals such as wild boar, sambar, barking deer and other smaller mammals moving in and out. These have adapted well to local conditions.

The major impact of mining is on the Bhadra river system which passes through the immediate vicinity of mining fields and is subjected to a heavy silt load, particularly during the first onslaught of monsoon rains in June-August. Incidentally, this is the period when most of the hill stream fish, amphibians and other microfauna of the terrestrial system begin to regenerate and a very critical period for the biodiversity of not only local but also major downstream river systems. The main grouse of the villagers and farmers downstream is that the silt load renders the water unfit for drinking and/or cultivation, particularly in the monsoon period. Cumulative effect over the years may have far reaching consequences in the Bhadra river system.

Heavy grazing by village cattle, ill-advised plantation on true grasslands in the KIOCL lease area as well as other grasslands in the Park with exotic *Acacia auriculiformes*, *Eucalyptus*, *Casuarina*, etc., and frequent setting of fire to grasslands without any scientific study on regeneration profile (which has led to colonisation of grasslands by weed-like fern species, depleting the grass available as food for wildlife, particularly gaur and sambar), are some of the major problems faced here.

Fortunately, the bulk of the dense pristine, Tropical Wet Evergreen and the Shola Forests as well as the grasslands are well away from the KIOCL and preserved by the sheer hilly terrain.



Except for the road from Mangalore to KIOCL, the area is comparatively free of human presence. The core area of the KNP is dense and well preserved due to its inaccessibility. This area, which comprises the central and western portion of the KNP, is home to the liontailed macaque, gaur, sambar, and many other smaller mammals, amphibians, reptiles and birds. Some scattered, old, legal settlements are present in this area but these are not very obvious, and as such there is not much disturbance to wildlife. These settlements need to be taken into account in the management plan of KNP as a long-term policy. A newly created national highway passes through the dense forests of the western region of KNP. Some strict measures have to be taken to see that no widening of the road and/or illegal encroachments take place here.

The creation of a separate Kudremukh Wildlife Division with its headquarters nearby is a major step taken by the State Government. However, like many of the government departments, this division is under-equipped and under-staffed with meagre budget allotments. The Division controls the gates, carries on fire protection measures, has established and maintains medicinal plant preservation plots in the Park besides a nature camp with visitor facilities, and carries out anti-poaching patrolling. The current DCF-Wildlife is a dedicated conservationist with a no-nonsense approach to forest protection. However, a scientifically designed management plan for the KNP has not yet been prepared and there is an immediate need for this. Local conservationists and experts should be involved by the Kudremukh Wildlife Division to prepare a comprehensive management plan for the KNP.

KIOCL must be made to pay full compensation and royalty to the Wildlife Department for the exploitation they have carried out so far and are continuing. This royalty could be given out of the profits the KIOCL earns from exploiting the resources. This could be anywhere

between 8-10 crores per annum and the amount can be utilised for research, conservation and maintenance expenses of the KNP. This is only the compensation for past and existing exploitation, and should be considered as a penalty. New areas should *never* be given to KIOCL for mining.

#### POSSIBLE FUTURE COURSE OF ACTION

##### Rationale

Sooner or later, the KIOCL may have to close down the mining operations at Kudremukh and pull out their establishment from the area. This will happen either due to pressure from environmental concerns and the Supreme Court directives or by the sheer economics of mining in the area. For one, the deposits will be exhausted very soon and there is very little chance of permission being given for additional mining concessions in either nearby Nellibeedu or at Gangrikal which is in the 'sanctum sanctorum' of the KNP.

The township (area 320 ha, population *c.* 10,000 in 1991) currently maintained by KIOCL has all the modern facilities including water supply and sewage treatment/disposal (see Appendices I and II). The layout of the town is well designed in an undulating landscape. Most of the original shola/grassland mosaic remains untouched between various housing sectors, giving it a natural look. An indicator of the naturalness is the presence of a large number of birds of Tropical Evergreen Forests, reptiles (including king cobra), and occasional barking deer, sambar, gaur, and giant squirrels that frequent the periphery of the township.

The town also has all the modern amenities such as STD/ISD, Cable TV network, a well maintained public park, half-hourly bus services (greater part travelled through the National Highway to Mangalore, *c.* 85 km, 2 hour drive) to the nearest airport/railway station.

Inevitably, KIOCL will have to surrender the mining lease and the land will have to be

reverted and added to the National Park. All the infrastructure that lies within the township and the mining area needs to be dealt with somehow.

For the KIOCL there are two choices:

- a. Demolish all structures and establishments in the township and mined area (and leave behind a ghastly concrete/steel rubble of a ghost town), or
- b. Hand over the main structures to an appropriate agency (National Park Authority) for possible future action/usage along with substantial seed money to deal with it.

Considering the fact that the area will legally be reverted back to a National Park and as such a full-scale independent township cannot exist within the Park, private commercial activities cannot be allowed, nor can there be any chance of promoting a holiday resort or a hill station for tourist activities. Perhaps the only pragmatic way to overcome this dilemma is to utilise the existing infrastructure to establish some kind of regional/national research/convention centre. The following possibilities can be seriously considered after setting up an appropriate taskforce with a mandate to devise ways and means to achieve the desired and pragmatic objectives.

### Recommended course of action

Constitute a taskforce with a definite mandate and time frame to:

- a. Conduct a preliminary feasibility study and report,
- b. Negotiate with KIOCL and all the likely stakeholders,
- c. Prepare an appropriate Action Plan,
- d. Source out funding regimes (including income generating schemes - e.g. facilities can be hired out as an international/national environment, scientific and conservation related conference and convention centre).

The possible nodal agencies to be involved are given in Appendix III.

### Some immediate recommendations

1. Stop all "afforestation schemes" and avoid plantations on either grasslands or deforested areas. The tropical rainforest is *capable of regenerating itself*, provided it is given adequate protection.
2. Monitor the growth of pioneer species in open areas and control the spread of any alien weeds.
3. Carry on experiments in the broken up mining areas to find the best way to encourage re-colonisation of pioneering species such as *Buddlija asiatica*, *Blumea oxydonta* and *Crotalaria pallida*.

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*KUDREMU KH NATIONAL PARK*

**Appendix I: Existing facilities at KIOCL township**

Permanent structures (other than mining area):

Structure	Facilities	Number
Administration building	3 stories with c. 100,000 sq. ft space	1
Sahyadri Bhavan (Guest House)	50+ rooms (A/C, non A/C), clubhouse, seminar halls, fully equipped modern kitchen & dining hall, swimming pool, etc.	1
Hostel	48 rooms + dining	1
Public hall + stage	500 seating capacity	1
Hospital + OT & amenities	40 bed capacity	1
Staff quarters (flats)	A - single	172
	- family	1,018
	B - single	88
	- family	405
	C - single	52
	- family	156
	D - senior ( bungalows)	48
Total (flats)		1,939
Mini shopping complexes	In different sectors of the township	7
KIOCL Training Centre	Details not available	—
CISF barracks + offices	Details not available	—
Public utility buildings	Post Office, Banks (3), Police station, Bus stand (mofussil & long distance)	6
Educational institutions	Central school, Convent school, Primary & High school, P.U. College , Computer center + internet facilities	6
Helipad	Heliport + VIP lounge	—
Wildlife Dept offices	ACF/RFO offices & Staff quarters	5
Places of worship	Temple, Mosque & Church	3
Lakya dam & backwaters	Freshwater source & sanctuary for hill stream fish, otters and other species	604 ha

Data compiled from different sources.

**Appendix II: Current annual maintenance expenses (staff salaries not included)**

Works	Amount Rs. (in lakhs)
Civil works/road maintenance etc.	189
Electricity/street lighting etc.	23.3
Recreational park	36
Annual total	248.3

Appendix III: Possible agencies to be involved in deciding the future of KIOCL

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*Nodal agencies:* Ministry of Environment & Forests, Government of India (MoEF/GOI)  
Karnataka State Ministry of Environment & Forests.

*Stakeholders:* MoEF/GOI:  
Zoological Survey of India  
Botanical Survey of India  
Forest Research Institute, Dehra Dun  
Wildlife Institute of India, Dehra Dun  
Department of Science & Technology (DST)  
Indian Council for Agricultural Research (ICAR)  
University Grants Commission (UGC)  
Any other appropriate agency

Karnataka:  
State Wildlife Department  
State Forestry College  
University of Agricultural Sciences (UAS), Bangalore  
Centre for Ecological Studies, Indian Institute of Science (CES/IISc)  
Indian Remote Sensing Agency (IRSA)  
Indian Space Research Organisation (ISRO), Bangalore  
Kuvempu University, Shankarghatta, Shimoga  
Any other appropriate agency

NGO/Institutions:  
Bombay Natural History Society (BNHS), Mumbai  
Sálim Ali Center for Ornithology & Natural History (SACON), Coimbatore.  
Any other national agency

*Funding sources:*

National:  
Government of India - MoEF  
Ministry of Science, Technology & Space  
Ministry of Agriculture  
Government of Karnataka - MoEF

International:  
United Nations Development Program (UNDP)  
United Nations Environment Program (UNEP)

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